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book devoted entirely to natural history being the more proper vehicle for such information,—we have thought it necessary to say thus much, in order that our readers may be placed in the right path when they wish to study the habits and characteristics of animals—one of the most interesting kinds of reading imaginable; "as interesting," as Johnson said of "Goldsmith's Animated Nature," "as a Persian tale."

And this mention of Goldsmith brings us naturally back to our immediate subject. Speaking of the birds of the pie kind, he says that they are the least useful to man of all the feathered creation, contributing neither to his pleasures or his necessities. In making this sweeping assertion, Goldsmith most unaccountably overlooked the crows, the "farmer's best friends," and the pigeons, fit eating for a king; but then, in Goldsmith's time, the crow was generally believed to be a grain-eater and a thief, and the pigeon was not a particularly favourite dish at the dinner-parties in Covent-garden. With these exceptions—and it really appears something like literary treason to say anything against poor Goldy's writings—his enumeration of the characteristics peculiar to the pie kind are extremely happy.

He goes on to say, that though, as a class, the "pies" are rather noxious than beneficial to mankind, and that they are false, noisy, and troublesome neighbours—he being within ear-shot of a rookery near Canonbury-tower, probably, while he was writing—they are yet, with respect to each other—having the rookery full in sight, perhaps.—the most social, ingenious, active, moral, and industrious of the whole family of birds. As a bachelor he could fully appreciate their domestic qualities, and therefore he tells us, that while the vultures and other birds of prey drive out their young before they are fit to struggle with their ills of bird-life—that while the ducks, the geese, and other birds of the poultry kind are faithless spouses and indifferent parents—and that while the sparrow tribe are noisy and careless of their home duties—the picæ are uniformly good husbands, good fathers, and first-rate nurses and nest makers! often living together in companies, and managing matters in a way that should be quite a pattern to mankind.

And then he grows eloquent upon the instinct displayed by this family of birds, instancing the teachable capabilities of ravens and jackdaws, hinting at the story of the "Maid and the Magpie," as something really surprising in the general family picture; and winding up his introduction by stating, that all the tribe, from the crow to the pigeon, agree in certain general particulars, namely, the possession of "hoarse voices, slight active bodies, and a facility of flight that baffles even the boldest of the rapacious kinds in the pursuit!"

But as Goldsmith says little of the toucan,—never having seen one, probably, out of a bird-shop window, and that one, most likely, barbarously "set up,"—we must go to better authority for our notice of this remarkable bird.

The toucan, then, belongs to the order *Picæ* and the genus *Ramphastos*, and may be described as having a monstrous hollow convex beak, serrated outwardly, with the nostrils behind the jaws, the tongue shaped something like a feather, and the toes, three before and one behind. It is known by various names, being sometimes called the Brazilian pie, and at other times the Bill-bird. In some kinds, the nostril is altogether wanting, the large hollow bill, which is seldom closely shut, serving the purpose instead. It is a native of South America, and the different kinds are arrayed in brilliant plumage, with which the ladies of Brazil and Peru decorate their heads and persons. The size of its body is about that of a jackdaw or pigeon, with a large head fitted to receive its enormous pair of mandibles. Like the aracaris of Brazil, which it very much resembles, the toucan is capable of being tamed, and several stories are told of its extreme vivacity and fondness for human society. At different times living specimens have been taken to England, but the coldness of the climate has generally proved fatal to them. In 1825, Mr. Broderip presented one to the Zoological Society of London, which lived for a considerable time. Its food was indifferently small birds and seeds; and it is not certainly known even to this day whether the toucan is carnivorous or granivorous. It is a nest builder, and would appear, from the formation of its beak and its strong talons to be tolerably well provided against the attacks of its numerous enemies—the serpents, monkeys, and other voracious animals of tropical forests.

The most surprising part of this curious bird is, of course, its enormous beak, which, in some species, is nearly as long as its body. But the specific gravity of this formidable-looking appendage is so small, compared to its size, as neither to impede the upward flight of the bird, or prevent its seeking its food with great activity and vigilance; while the eyes are so placed as to be in no way inconvenienced except in one direction. This remarkable beak, says La Vaillant, forms almost as curious and wonderful an example of peculiar organisation as the trunk of an elephant; and—quoting Mrs. Barbauld's well-known and exquisite lines—may we not exclaim, on gazing on this curious and wonderful bird,—

> "I hear the voice of God among the trees,
> In every leaf that trembles to the breeze,
> In every creature own His forming power,
> In each event His providence adore."

The specimen of the Toucan shown in the engraving is called the Crested Toucan; and the smaller bird is called the Spotted Fishing Martin, also belonging to the *picæ* family.

PEAT AND ITS PRODUCTS.

AMONGST the many remedies propounded for the relief of our Irish brethren, few seem to promise more successful results than the manufacture of its bog-earth; for from it may be obtained a great variety of useful substances—tallow, charcoal, sulphate of ammonia, naphtha, oils, &c. &c. In a lecture delivered by Professor Brande, at the Royal Institution, the nature and products of peat were explained, and the uses to which such products might be applied familiarly illustrated. The professor described a peat-bog as a superficial stratum of vegetable matter, which at different depths had undergone, or is still undergoing, various stages of changes and decomposition. The superficial appearance of a peat-bog is that of a mass of half-decayed heath, mosses, rushes, and grasses, the roots of which have successively died away, though the plants still continue to vegetate. The mass is liqueous, and imbued, among other products of slow decay, with humic (from *humus*, the ground), or humous acid; and the abundance of moisture pervading the bog at once affects the character of the peat and the surrounding district.

The upper layers of the bog are usually of a loose fibrous texture, and of a pale brown colour; but beneath the surface the density of the mass is found to increase considerably; till at last the distinct character of the vegetable ceases to be discernible, and the bog appears almost homogeneous, and of a dark-brown or blackish colour. In the midst of this mass are occasionally found the trunks of trees and some curious geological phenomena, laying in various positions and at different depths. A peat-bog—and, indeed, the entire district—may, therefore, be regarded as the consolidated produce of enormous primeval forests and fields of vegetation, covering in the aggregate millions of acres. It is a fact, no less curious than remarkable, that one-tenth of the whole surface of Ireland is covered with peat-bog, which is not only valuable in itself, but which, if removed, would exhibit a soil beneath eminently fitted for the operations of the agriculturist.

In the lecture alluded to, Professor Brande exhibited various samples of peat, taken from the upper, lower, and middle portions of the bog. He particularly noticed the tallow peat of the bank of Lough Neagh, which, from the brilliant flame attending its combustion, is sometimes rendered available as a source of light as well as heat—for it must be understood, that, until lately, bog-peat was used simply as fuel.

Peat may be rendered highly useful for a great variety of purposes; which, however, for the present may be resolved into two,—charcoal, and the various productions derivable from what is called its destructive distillation. When peat is to be converted into charcoal, the plan adopted by the Irish Amelioration Society is to carbonise blocks of bog-earth, partially dried on trays of wickerwork, in moveable pyramidal furnaces—in much the same way, indeed, as ordinary charcoal is produced from the branches of trees. The charcoal thus produced varies considerbly in character from the peat from which it had its origin, as well as in the density of some specimens compared with that of others. In stove drying, dense peat loses about one-third, and the light and porous kind as much as one-half its weight; four tons of dried peat not producing much more than one ton of charcoal. When the peat, however, is properly compressed previous to its carbonisation—which a recently-invented machine enables the manufacturer to readily do—the charcoal resulting from the process exceeds in density that made from wood; and for the purposes of iron smelting it is said to be admirably adapted, owing to its great freedom from sulphur. As a purifying and deodorising agent, the charcoal of peat is eminently fitted.

The products of the destructive distillation of peat are as various as they are valuable. The elements of peat are precisely those of wood and coal—nitrogen, hydrogen, oxygen, and carbon. If, therefore, we distil peat in close vessels, the products obtained are precisely similar to those which are obtainable from wood and coal under like circumstances. Till lately the expense attending the distillation of peat has prevented its general adoption. The employment, however, of a recently-invented blast furnace, which differs in principle from that in which iron is melted, by having an arrangement for collecting the products of combustion, has enabled the experimentaliser to obtain ammonia, acetic acid, pyroxylic spirit, tar, naphtha, oils, and paraffine, together with large quantities of inflammable gases from the peat.

These various products are, as is well known, of great use in the arts. Sulphate of ammonia is employed in the preparation of carbonate and muriate of ammonia, in caustic ammonia, and in the manufacture of various manures and fertilising composts; acetate of lime is in constant demand as a source of acetic acid, and of various acetates largely consumed by calico printers; pyroxylic spirit (or wood alcohol), is used in vapour lamps, and in the preparation of several kinds of varnish; naphtha is used extensively for disolving caoutchouc, for making varnishes, and also for burning in lamps; the heavy and fixed oils mentioned are very useful in lubricating machinery, especially when intimately mixed with other oils, or it may be used as a cheap lamp oil for the production of lampblack: and, lastly, the paraffine, when mixed with fatty matter such as sperm and stearine, forms excellent candles.

Here, then, are no fewer than seven different substances producible from the hitherto neglected and dangerous peat-bogs of Ireland, and which only require the exercise of skill and patience, joined with the careful employment of capital, to render them available for all the purposes indicated.

FORMATION OF ÆTHER.

The decomposition of alcohol into æther and water is not interesting merely by the production of æther, but is especially so as an example of a particular kind of decomposition, which cannot be so well followed with any other substance, and which is manifested in the formation of some important products, for example, in that of alcohol itself.

M. Mitscherlich, the well known chemist, has endeavoured to elucidate the phenomena of this decomposition by the following experiments:—Take a mixture of 100 parts of sulphuric acid, 20 of water, and 50 of anhydrous alcohol, and heat it gradually until its boiling point becomes 284 degrees Fahr. Alcohol is then allowed to fall gradually into the vessel which contains the mixture, and the current is to be so regulated that the heat of the mixture remains constantly at 284 degrees. If, for example, the operation be conducted with a mixture of six ounces of sulphuric acid, $1\frac{1}{5}$ ounce of water, and 3 of alcohol, and if the density of each two ounces of product as it is obtained be taken, it will be observed that this density passes gradually from 0·780 to 0·788 and 0·798, and afterwards remains constantly at the last mentioned density, which is exactly that of the alcohol employed.

If the operation be properly conducted, an unlimited quantity of alcohol may be converted into æther, provided that the sulphuric acid does not change. The distilled liquor is formed of two distinct fluids; the upper one is æther, containing a little water and alcohol; the lower one is water, with a little alcohol and æther. Its weight is nearly equal to that of the alcohol employed, and it is composed of æther, 65; alcohol, 18; water, 17—100. If into six ounces of concentrated sulphuric acid six ounces of pure alcohol are suffered to flow gradually, a product of constant density is not obtained until the sulphuric acid has taken its proportion of water. Take, on the contrary, three ounces of sulphuric acid and two ounces of water, and let alcohol be added, drop by drop; the first two ounces distilled are merely spirits of wine of specific gravity 0·926, containing scarcely a trace of æther. The density decreases until the quantity of water of the sulphuric acid is reduced to its proportion, and the product of the distillation has acquired the density of the alcohol.

If concentrated sulphuric acid be added to anhydrous alcohol in excess, pure alcohol distils at first; but when the temperature reaches nearly 260 degrees, the first traces of æther begin to appear; the production of æther is at its maximum between 284 and 302 degrees. It results, from the preceding observations, that alcohol, when in contact with sulphuric acid, is converted into æther and water at a temperature of about 284 degrees.

OBERWESEL.

In descending the Rhine between Kaul and the Pfalzgrafenstein, the towers of Wesel are seen rising from a dark and rocky background, and above them the commanding ruins of the castle of Schönberg. This fortress was built by the Lords of Schönberg, who were all powerful during the middle ages in Wesel, and in the last centuries, under the title of Counts of Schömberg, were created grandees of Portugal, and peers of England, for their military deeds. The romantic spirit of the inhabitants of the Rhineland, however, derived the name or the castle from seven beautiful ladies who once inhabited it, and are said to have captivated every one who beheld them by their charms. On account of their vanity, these seven noble ladies are said to have been transformed into the seven pointed rocks which, at low water, are seen just below Wesel, and are called by the boatmen the "seven sisters." The tradition further says, that if these seven rocks were raised from the river-bed, and used to build a chapel, the "seven sisters" would be freed from the enchantment which at present enchains them. The situation of Oberwesel is one of the most romantic, and, to judge from the number of artists who visit it, picturesque parts of the Rhine valley. Above and below the town two green vine-covered valleys run into the hills, enclosing between them the old-fashioned buildings, the sombre turrets, tall spires, and quaint towers of Oberwesel. The churches are worthy of observation, especially the slender spire of the Church of our Lady, which attracts the attention of every passer by, by its singularly shaped tower. The interior of the church is most interesting to the antiquarian; the richly ornamented *lectorium*, and the carved altar, with its folding doors, in which designs are executed with a sharpness and beauty such as is even seldom seen in stone. Not far from this church stands the old gate, but the road no longer leads through its grey walls into the town. At the opposite end is a tower such as we find at Andernach: the most extensive view is, however, to be obtained from the church of St. Martin. The small old church, which is built into the wall, is said to have been dedicated to the memory of some children who were supposed to have suffered martyrdom at the hands of the Jews. Another curiosity of Oberwesel, and one which all visitors are taken to inspect, is the footprint of St. Hubert's horse in the market-place, although tradition does not state the manner in which it became impressed in the pavement.